

SEQUENCE LISTING

<110> Shorrosh, Basil S.
DeBonte, Lorin R.

<120> PLANTS CONTAINING A CYTOSOLIC ACETYL
COA-CARBOXYLASE

<130> 07148-094001

<150> US 60/198,794

<151> 2000-04-20

<160> 12

<170> FastSEQ for Windows Version 4.0

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<211> 56

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<220>

<223> primer for PCR

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56

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<400> 2

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45

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<212> DNA

<213> Nicotiana tabacum

<220>

<221> CDS

<222> (1)...(204)

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48

1

5

10

15

ggt gct caa gct aac atg gtt gca cct ttc act ggc ctt aag tca gct
Val Ala Gln Ala Asn Met Val Ala Pro Phe Thr Gly Leu Lys Ser Ala

96

20

25

30

gcc tca ttc cct gtt tca agg aag caa aac ctt gac atc act tcc att 144
 Ala Ser Phe Pro Val Ser Arg Lys Gln Asn Leu Asp Ile Thr Ser Ile
 35 40 45

gcc agc aac ggc gga aga gtg caa tgc atg cag gtg tgg cca cca att 192
 Ala Ser Asn Gly Gly Arg Val Gln Cys Met Gln Val Trp Pro Pro Ile
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aac aag aag tcc 204
 Asn Lys Lys Ser
 65

<210> 4
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 <212> PRT
 <213> Nicotiana tabacum

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 20 25 30
 Ala Ser Phe Pro Val Ser Arg Lys Gln Asn Leu Asp Ile Thr Ser Ile
 35 40 45
 Ala Ser Asn Gly Gly Arg Val Gln Cys Met Gln Val Trp Pro Pro Ile
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 Asn Lys Lys Ser
 65

<210> 5
 <211> 149
 <212> DNA
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<220>
 <223> representative construct (5' end)

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<210> 6
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> representative construct (5' end)

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<210> 7
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<212> DNA

<213> Medicago sativa

<220>

<221> CDS

<222> (1)...(6771)

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1 5 10 15	

agt agg cac cct gct act aca acc gaa gta gat gaa tac tgc aat gcc	96
Ser Arg His Pro Ala Thr Thr Thr Glu Val Asp Glu Tyr Cys Asn Ala	
20 25 30	

ctt gga gga aac aag ccg att cat agc ata ttg att gca aac aat gga	144
Leu Gly Gly Asn Lys Pro Ile His Ser Ile Leu Ile Ala Asn Asn Gly	
35 40 45	

atg gca gca gtc aag ttt ata cgt agt gtt agg agt tgg gct tac gag	192
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50 55 60	

aca ttt ggc acg gaa aaa gct atc ttg ttg gtt gcc atg gca act cca	240
Thr Phe Gly Thr Glu Lys Ala Ile Leu Leu Val Ala Met Ala Thr Pro	
65 70 75 80	

gag gat atg aga atc aat gca gaa cat atc aga ata gcc gat caa ttt	288
Glu Asp Met Arg Ile Asn Ala Glu His Ile Arg Ile Ala Asp Gln Phe	
85 90 95	

gtg gaa gta cct ggt ggg acc aat aac aat aac tac gcc aat gtg cag	336
Val Glu Val Pro Gly Gly Thr Asn Asn Asn Asn Tyr Ala Asn Val Gln	
100 105 110	

ctt att cta gag att gct gag ata act cac gtt gat gcg gtg tgg cct	384
Leu Ile Leu Glu Ile Ala Glu Ile Thr His Val Asp Ala Val Trp Pro	
115 120 125	

ggt tgg ggt cat gca tca gaa aat cct gag ctt cca gat gca tta aaa	432
Gly Trp Gly His Ala Ser Glu Asn Pro Glu Leu Pro Asp Ala Leu Lys	
130 135 140	

gca aag gga att gta ttc ctt gga cct cct gct ata tct atg gca gca	480
Ala Lys Gly Ile Val Phe Leu Gly Pro Pro Ala Ile Ser Met Ala Ala	
145 150 155 160	

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Leu Gly Asp Lys Ile Gly Ser Ser Leu Ile Ala Gln Ala Ala Glu Val	
165 170 175	

cca acc ctt cca tgg agt ggt tct cat gtg aaa att cct cca gaa agt	576
Pro Thr Leu Pro Trp Ser Gly Ser His Val Lys Ile Pro Pro Glu Ser	
180 185 190	

gac ttg att act att cct gat gaa att tac cgt gca gca tgt gtt tat	624
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His	Asn	Asp	Asp	Glu	Val	Arg	Ala	Leu	Phe	Lys	Gln	Val	Gln	Gly	Glu		
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Val	Pro	Gly	Ser	Pro	Ile	Phe	Ile	Met	Lys	Val	Ala	Ser	Gln	Ser	Arg		
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Glu	Gln	Ala	Ala	Arg	Arg	Leu	Ala	Lys	Ser	Val	Asn	Tyr	Val	Gly	Ala		
				325					330					335			
gct	acc	gtt	gag	tat	ctt	tat	agc	atg	gaa	act	ggc	gag	tac	tac	ttt	1056	
Ala	Thr	Val	Glu	Tyr	Leu	Tyr	Ser	Met	Glu	Thr	Gly	Glu	Tyr	Tyr	Phe		
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Leu	Glu	Leu	Asn	Pro	Arg	Leu	Gln	Val	Glu	His	Pro	Val	Thr	Glu	Trp		
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Ile	Ala	Glu	Ile	Asn	Leu	Pro	Ala	Ala	Gln	Val	Ala	Val	Gly	Met	Gly		
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His	Gly	Gly	Gly	Asn	Asp	Gly	Trp	Lys	Lys	Thr	Ser	Val	Leu	Ala	Thr		
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cct	ttt	gat	ttt	gac	gaa	gca	caa	tct	aca	aag	ccg	aaa	ggg	cat	tgt	1296	
Pro	Phe	Asp	Phe	Asp	Glu	Ala	Gln	Ser	Thr	Lys	Pro	Lys	Gly	His	Cys		

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tgg gct tat ttc tct gtt aag tcc gga gga gga att cat gaa ttc tca Trp Ala Tyr Phe Ser Val Lys Ser Gly Gly Gly Ile His Glu Phe Ser 465 470 475 480			1440
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tct ctt gtc cat tct caa gtt tct ttg agc att gaa gga agc aaa tac Ser Leu Val His Ser Gln Val Ser Leu Ser Ile Glu Gly Ser Lys Tyr 595 600 605			1824
acg att gac atg gta cga gga gga cct gga agt tac aaa ttg aaa ttg Thr Ile Asp Met Val Arg Gly Gly Pro Gly Ser Tyr Lys Leu Lys Leu 610 615 620			1872
aat caa tcg gag ata gaa gcg gag ata cac act tta cgt gat gga ggt Asn Gln Ser Glu Ile Glu Ala Glu Ile His Thr Leu Arg Asp Gly Gly 625 630 635 640			1920
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gaa gca gct gga act cgg ctt tta ata gat gga agg act tgc ttg ctt Glu Ala Ala Gly Thr Arg Leu Leu Ile Asp Gly Arg Thr Cys Leu Leu 660 665 670	2016
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cca tat gct gaa gtt gag gtc atg aag atg tgc atg cct ctt ctt tcc Pro Tyr Ala Glu Val Glu Val Met Lys Met Cys Met Pro Leu Leu Ser 705 710 715 720	2160
cct gct tct gga att att cat ttc aga atg gct gaa ggt caa gcc atg Pro Ala Ser Gly Ile Ile His Phe Arg Met Ala Glu Gly Gln Ala Met 725 730 735	2208
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Ser Ile Phe Arg Ser Leu Met Gly Ala Met Glu Glu Leu Glu Leu Asn			
1345	1350	1355	1360
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Ser His Asn Thr Thr Ile Lys Ser Glu His Ala His Met Tyr Leu Tyr			
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Ile Ile Arg Glu Gln Gln Ile Asp Asp Leu Val Pro Tyr Ser Lys Lys			
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att aac ata gaa gct ggc caa gaa gaa aca aca gtt gag gca atc ttg			4224
Ile Asn Ile Glu Ala Gly Gln Glu Glu Thr Thr Val Glu Ala Ile Leu			
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Glu Glu Leu Ala Gln Glu Ile His Ser Ser Val Gly Val Arg Met His			
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Arg Leu Gly Val Phe Val Trp Glu Ile Lys Leu Trp Ile Thr Ala Cys			
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Gly Gln Ala Asn Gly Ala Trp Arg Val Ile Val Asn Asn Val Thr Gly			
1445	1450	1455	
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His Thr Cys Thr Val His Ile Tyr Arg Glu Met Glu Asp Ala Thr Thr			
1460	1465	1470	
cat aaa gtg gtc tac agt tca gtc act gta aag ggt ccg ttg cat ggt			4464
His Lys Val Val Tyr Ser Ser Val Thr Val Lys Gly Pro Leu His Gly			
1475	1480	1485	
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Val Pro Val Asn Glu Asn Tyr Gln Pro Leu Gly Gly Ile Asp Arg Lys			
1490	1495	1500	
cgt ctt gca gcg aga aag aac agc acc aca tac tgc tat gat ttc ccc			4560
Arg Leu Ala Ala Arg Lys Asn Ser Thr Thr Tyr Cys Tyr Asp Phe Pro			
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Leu Ala Phe Gln Thr Ser Leu Glu Gln Ser Trp Ser Ile Gln Gln Thr			
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Lys Phe Ser Glu Lys Ala Gly Ser Trp Gly Thr Ser Leu Val Pro Ala			
1555	1560	1565	

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aag gac agc ttt gtg gag aca cta gaa gga tgg gct aga aca gtt gtt Lys Asp Ser Phe Val Glu Thr Leu Glu Gly Trp Ala Arg Thr Val Val 1875 1880 1885	5664
aca gga agg gca aag ctt gga gga atc cct gtg gga att gtt gcg gtg Thr Gly Arg Ala Lys Leu Gly Gly Ile Pro Val Gly Ile Val Ala Val 1890 1895 1900	5712
gaa aca caa aca gtt atg caa ata ata cct gct gat cca ggt caa ctt Glu Thr Gln Thr Val Met Gln Ile Ile Pro Ala Asp Pro Gly Gln Leu 1905 1910 1915 1920	5760
gat tct cac gag agg gtt gtt cct caa gcc ggg cag gtg tgg ttt cct Asp Ser His Glu Arg Val Val Pro Gln Ala Gly Gln Val Trp Phe Pro 1925 1930 1935	5808
gat tct gcg acc aag acg gcc caa gcg ata ttg gat ttc aac aga gaa Asp Ser Ala Thr Lys Thr Ala Gln Ala Ile Leu Asp Phe Asn Arg Glu 1940 1945 1950	5856
gaa ctc cca ctt ttc att atc gca aac tgg aga ggc ttt tca ggt gga Glu Leu Pro Leu Phe Ile Ile Ala Asn Trp Arg Gly Phe Ser Gly Gly 1955 1960 1965	5904
caa agg gac ctt ttt gaa gga att ctt cag gct ggt tcg act att gtg Gln Arg Asp Leu Phe Glu Gly Ile Leu Gln Ala Gly Ser Thr Ile Val 1970 1975 1980	5952
gag aac ctt agg aca tac aaa cag ccc ata ttt gta tac att cca atg Glu Asn Leu Arg Thr Tyr Lys Gln Pro Ile Phe Val Tyr Ile Pro Met 1985 1990 1995 2000	6000
atg ggt gaa ctc cga ggc ggg gct tgg gtt gtt gtc gac agc cga atc Met Gly Glu Leu Arg Gly Gly Ala Trp Val Val Val Asp Ser Arg Ile 2005 2010 2015	6048
aac tca gac cac att gaa atg tat gct gag cga acg gcc aaa ggt aac	6096

Asn	Ser	Asp	His	Ile	Glu	Met	Tyr	Ala	Glu	Arg	Thr	Ala	Lys	Gly	Asn	
			2020					2025					2030			
gtc	ctt	gag	ccg	gaa	gga	atg	att	gaa	atc	aaa	ttt	aga	aca	aga	gaa	6144
Val	Leu	Glu	Pro	Glu	Gly	Met	Ile	Glu	Ile	Lys	Phe	Arg	Thr	Arg	Glu	
			2035				2040					2045				
ttg	ttg	gag	tgt	atg	aga	aga	ctt	gat	caa	caa	ttg	att	aat	ttg	aag	6192
Leu	Leu	Glu	Cys	Met	Arg	Arg	Leu	Asp	Gln	Gln	Leu	Ile	Asn	Leu	Lys	
			2050				2055				2060					
gaa	aaa	ctt	tct	gaa	gcc	aag	agt	aac	aag	gac	tat	ggt	gca	tat	gat	6240
Glu	Lys	Leu	Ser	Glu	Ala	Lys	Ser	Asn	Lys	Asp	Tyr	Gly	Ala	Tyr	Asp	
			2065			2070				2075				2080		
tct	ctg	cag	cag	cag	att	aga	ttc	cgt	gag	aaa	cag	ctt	ttg	cct	ttg	6288
Ser	Leu	Gln	Gln	Gln	Ile	Arg	Phe	Arg	Glu	Lys	Gln	Leu	Leu	Pro	Leu	
				2085				2090					2095			
tat	act	cag	ata	gct	aca	aaa	ttt	gct	gaa	ctc	cat	gat	act	tca	tta	6336
Tyr	Thr	Gln	Ile	Ala	Thr	Lys	Phe	Ala	Glu	Leu	His	Asp	Thr	Ser	Leu	
			2100					2105				2110				
aga	atg	aaa	gca	aag	ggt	gta	atc	aga	gaa	gtt	ctt	gat	tgg	cgt	aag	6384
Arg	Met	Lys	Ala	Lys	Gly	Val	Ile	Arg	Glu	Val	Leu	Asp	Trp	Arg	Lys	
			2115				2120				2125					
tcg	cgt	tct	gtc	ttc	tat	cag	aga	ctg	cac	agg	aga	atc	ggt	gag	cac	6432
Ser	Arg	Ser	Val	Phe	Tyr	Gln	Arg	Leu	His	Arg	Arg	Ile	Gly	Glu	His	
			2130			2135				2140						
tca	ctg	atc	aac	atc	gtg	aga	gat	gct	gct	ggt	gac	caa	ttg	tca	tat	6480
Ser	Leu	Ile	Asn	Ile	Val	Arg	Asp	Ala	Ala	Gly	Asp	Gln	Leu	Ser	Tyr	
			2145		2150			2155				2160				
gtt	tct	gcc	atg	aac	ttg	ctc	aaa	gaa	tgg	tat	ctg	aat	tct	gat	atc	6528
Val	Ser	Ala	Met	Asn	Leu	Leu	Lys	Glu	Trp	Tyr	Leu	Asn	Ser	Asp	Ile	
				2165				2170			2175					
gcc	aaa	ggt	aga	gaa	gat	gct	tgg	ttg	gac	gat	gaa	gcc	ttc	ttc	aga	6576
Ala	Lys	Gly	Arg	Glu	Asp	Ala	Trp	Leu	Asp	Asp	Glu	Ala	Phe	Phe	Arg	
			2180				2185				2190					
tgg	agg	gat	gat	cca	gca	aac	tac	gag	gat	aaa	cta	aag	gaa	ttg	cgc	6624
Trp	Arg	Asp	Asp	Pro	Ala	Asn	Tyr	Glu	Asp	Lys	Leu	Lys	Glu	Leu	Arg	
			2195				2200				2205					
gtc	cag	aga	ctg	ttg	ctt	cag	ttg	aca	aat	att	ggc	gac	tcg	gct	cta	6672
Val	Gln	Arg	Leu	Leu	Leu	Gln	Leu	Thr	Asn	Ile	Gly	Asp	Ser	Ala	Leu	
			2210			2215				2220						
gat	tta	caa	gct	cta	cct	caa	ggt	ctt	gcc	gcc	ctt	tta	agc	aag	ttg	6720
Asp	Leu	Gln	Ala	Leu	Pro	Gln	Gly	Leu	Ala	Ala	Leu	Leu	Ser	Lys	Leu	
			2225		2230			2235			2240					
gaa	gca	tca	agt	cgc	gat	aag	ttg	atc	agt	gaa	ctt	cgc	aaa	gta	ctc	6768
Glu	Ala	Ser	Ser	Arg	Asp	Lys	Leu	Ile	Ser	Glu	Leu	Arg	Lys	Val	Leu	

2255

6821

6881
6941
7001
7061
7121
7151

<213> Medicago sativa

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Ser	Arg	His	Pro	Ala	Thr	Thr	Thr	Glu	Val	Asp	Glu	Tyr	Cys	Asn	Ala
			20					25					30		
Leu	Gly	Gly	Asn	Lys	Pro	Ile	His	Ser	Ile	Leu	Ile	Ala	Asn	Asn	Gly
		35					40					45			
Met	Ala	Ala	Val	Lys	Phe	Ile	Arg	Ser	Val	Arg	Ser	Trp	Ala	Tyr	Glu
	50					55					60				
Thr	Phe	Gly	Thr	Glu	Lys	Ala	Ile	Leu	Leu	Val	Ala	Met	Ala	Thr	Pro
65					70					75				80	
Glu	Asp	Met	Arg	Ile	Asn	Ala	Glu	His	Ile	Arg	Ile	Ala	Asp	Gln	Phe
				85				90						95	
Val	Glu	Val	Pro	Gly	Gly	Thr	Asn	Asn	Asn	Asn	Tyr	Ala	Asn	Val	Gln
			100					105					110		
Leu	Ile	Leu	Glu	Ile	Ala	Glu	Ile	Thr	His	Val	Asp	Ala	Val	Trp	Pro
		115					120					125			
Gly	Trp	Gly	His	Ala	Ser	Glu	Asn	Pro	Glu	Leu	Pro	Asp	Ala	Leu	Lys
	130					135					140				
Ala	Lys	Gly	Ile	Val	Phe	Leu	Gly	Pro	Pro	Ala	Ile	Ser	Met	Ala	Ala
145					150					155				160	
Leu	Gly	Asp	Lys	Ile	Gly	Ser	Ser	Leu	Ile	Ala	Gln	Ala	Ala	Glu	Val
			165					170						175	
Pro	Thr	Leu	Pro	Trp	Ser	Gly	Ser	His	Val	Lys	Ile	Pro	Pro	Glu	Ser
			180					185					190		
Asp	Leu	Ile	Thr	Ile	Pro	Asp	Glu	Ile	Tyr	Arg	Ala	Ala	Cys	Val	Tyr
		195					200					205			
Thr	Thr	Glu	Glu	Ala	Ile	Ala	Ser	Cys	Gln	Val	Val	Gly	Tyr	Pro	Ala
	210					215					220				
Met	Ile	Lys	Ala	Ser	Trp	Gly	Gly	Gly	Gly	Lys	Gly	Ile	Arg	Lys	Val
225					230					235				240	
His	Asn	Asp	Asp	Glu	Val	Arg	Ala	Leu	Phe	Lys	Gln	Val	Gln	Gly	Glu
				245				250						255	
Val	Pro	Gly	Ser	Pro	Ile	Phe	Ile	Met	Lys	Val	Ala	Ser	Gln	Ser	Arg
			260					265					270		
His	Leu	Glu	Val	Gln	Leu	Ile	Cys	Asp	Gln	His	Gly	Asn	Phe	Ala	Ala
		275					280					285			
Leu	His	Ser	Arg	Asp	Cys	Ser	Val	Gln	Arg	Arg	His	Gln	Lys	Ile	Ile
	290					295					300				

Glu	Glu	Gly	Pro	Ile	Thr	Val	Ala	Pro	Pro	Glu	Thr	Val	Lys	Glu	Leu
305					310					315					320
Glu	Gln	Ala	Ala	Arg	Arg	Leu	Ala	Lys	Ser	Val	Asn	Tyr	Val	Gly	Ala
				325					330					335	
Ala	Thr	Val	Glu	Tyr	Leu	Tyr	Ser	Met	Glu	Thr	Gly	Glu	Tyr	Tyr	Phe
			340					345					350		
Leu	Glu	Leu	Asn	Pro	Arg	Leu	Gln	Val	Glu	His	Pro	Val	Thr	Glu	Trp
		355					360					365			
Ile	Ala	Glu	Ile	Asn	Leu	Pro	Ala	Ala	Gln	Val	Ala	Val	Gly	Met	Gly
	370					375					380				
Ile	Pro	Leu	Trp	Gln	Ile	Pro	Glu	Ile	Arg	Arg	Phe	Tyr	Gly	Met	Glu
385					390					395					400
His	Gly	Gly	Gly	Asn	Asp	Gly	Trp	Lys	Lys	Thr	Ser	Val	Leu	Ala	Thr
				405					410					415	
Pro	Phe	Asp	Phe	Asp	Glu	Ala	Gln	Ser	Thr	Lys	Pro	Lys	Gly	His	Cys
			420					425					430		
Val	Ala	Val	Arg	Val	Thr	Ser	Glu	Asp	Pro	Asp	Asp	Gly	Phe	Thr	Pro
		435					440					445			
Thr	Gly	Gly	Lys	Val	Gln	Glu	Leu	Ser	Phe	Lys	Ser	Lys	Pro	Asn	Val
	450					455						460			
Trp	Ala	Tyr	Phe	Ser	Val	Lys	Ser	Gly	Gly	Gly	Ile	His	Glu	Phe	Ser
465					470					475					480
Asp	Ser	Gln	Phe	Gly	His	Val	Phe	Ala	Phe	Gly	Glu	Ser	Arg	Ala	Leu
				485					490					495	
Ala	Ile	Ala	Asn	Met	Val	Leu	Gly	Leu	Lys	Glu	Ile	Gln	Ile	Arg	Gly
			500					505					510		
Glu	Ile	Arg	Thr	Asn	Val	Asp	Tyr	Thr	Ile	Asp	Leu	Leu	Asn	Ala	Ser
		515					520					525			
Asp	Tyr	Arg	Asp	Asn	Lys	Ile	His	Thr	Gly	Trp	Leu	Asp	Ser	Arg	Ile
	530					535					540				
Ala	Met	Arg	Val	Arg	Ala	Glu	Arg	Pro	Pro	Trp	Tyr	Leu	Ser	Val	Val
545					550					555					560
Gly	Gly	Ala	Leu	Tyr	Lys	Ala	Ser	Ala	Ser	Ser	Ala	Ala	Leu	Val	Ser
				565					570					575	
Asp	Tyr	Val	Gly	Tyr	Leu	Glu	Lys	Gly	Gln	Ile	Pro	Pro	Lys	His	Ile
			580					585					590		
Ser	Leu	Val	His	Ser	Gln	Val	Ser	Leu	Ser	Ile	Glu	Gly	Ser	Lys	Tyr
		595					600					605			
Thr	Ile	Asp	Met	Val	Arg	Gly	Gly	Pro	Gly	Ser	Tyr	Lys	Leu	Lys	Leu
	610					615					620				
Asn	Gln	Ser	Glu	Ile	Glu	Ala	Glu	Ile	His	Thr	Leu	Arg	Asp	Gly	Gly
625					630					635					640
Leu	Leu	Met	Gln	Leu	Asp	Gly	Asn	Ser	His	Val	Ile	Tyr	Ala	Glu	Glu
				645					650					655	
Glu	Ala	Ala	Gly	Thr	Arg	Leu	Leu	Ile	Asp	Gly	Arg	Thr	Cys	Leu	Leu
			660					665					670		
Gln	Asn	Asp	Asp	Asp	Pro	Ser	Lys	Leu	Ile	Gly	Glu	Thr	Pro	Cys	Lys
		675					680					685			
Leu	Leu	Arg	Tyr	Leu	Val	Ala	Asp	Asp	Ser	Gln	Ile	Asp	Ala	Asp	Thr
	690					695					700				
Pro	Tyr	Ala	Glu	Val	Glu	Val	Met	Lys	Met	Cys	Met	Pro	Leu	Leu	Ser
705					710					715					720
Pro	Ala	Ser	Gly	Ile	Ile	His	Phe	Arg	Met	Ala	Glu	Gly	Gln	Ala	Met
				725					730					735	
Gln	Ala	Gly	Glu	Leu	Ile	Ala	Lys	Leu	Asp	Leu	Asp	Asp	Gly	Ser	Ala
			740				745					750			
Val	Arg	Lys	Ala	Glu	Pro	Phe	Thr	Gly	Ser	Phe	Pro	Ile	Leu	Gly	Pro

755	760	765
Pro Thr Ala Ile Ser Gly Lys Val His Gln Lys Cys Ala Ala Ser Leu		
770	775	780
Asn Ala Ala Arg Met Ile Leu Ala Gly Tyr Glu His Asn Ile Asp Glu		
785	790	795
Val Val Val Lys Ser Leu Leu Asn Cys Leu Asp Ser Pro Glu Leu Pro		800
	805	810
		815
Phe Leu Gln Trp Gln Glu Cys Phe Ala Val Leu Ala Thr Arg Leu Pro		
	820	825
		830
Lys Asp Leu Arg Asn Glu Leu Glu Ala Lys Tyr Lys Glu Phe Glu Ile		
	835	840
		845
Ile Ser Ser Ser Gln Thr Ile Asp Phe Pro Ala Lys Leu Leu Lys Ala		
	850	855
		860
Ile Leu Glu Ala His Leu Ser Ser Cys Pro Glu Asn Glu Lys Gly Ala		
865	870	875
		880
Leu Glu Arg Leu Val Glu Pro Leu Thr Ser Leu Val Lys Ser Tyr Glu		
	885	890
		895
Gly Gly Arg Glu Ser His Ala His Lys Ile Val Gln Ser Leu Phe Glu		
	900	905
		910
Glu Tyr Leu Ser Val Glu Glu Leu Phe Ser Asp Asn Ile Gln Ala Asp		
	915	920
		925
Val Ile Glu Arg Leu Arg Leu Gln Tyr Lys Lys Asp Leu Leu Lys Ile		
	930	935
		940
Val Asp Ile Val Leu Ser His Gln Gly Val Lys Ser Lys Asn Lys Leu		
945	950	955
		960
Ile Leu Arg Leu Met Asp Lys Leu Val Tyr Pro Asn Pro Ala Ala Tyr		
	965	970
		975
Arg Asp Gln Leu Ile Arg Phe Ser Gln Leu Asn His Ile Val Tyr Ser		
	980	985
		990
Glu Leu Ala Leu Lys Ala Ser Gln Leu Leu Glu Gln Thr Lys Leu Ser		
	995	1000
		1005
Glu Leu Arg Ser Ser Ile Ala Arg Ser Leu Ser Glu Leu Glu Met Phe		
	1010	1015
		1020
Thr Glu Asp Gly Glu Asn Ile Asp Thr Pro Lys Arg Lys Ser Ala Ile		
1025	1030	1035
		1040
Asn Asp Arg Met Glu Asp Leu Val Ser Ala Pro Leu Ala Val Glu Asp		
	1045	1050
		1055
Ala Leu Val Gly Leu Phe Asp His Ser Asp His Thr Leu Gln Arg Arg		
	1060	1065
		1070
Val Val Glu Thr Tyr Ile Arg Arg Leu Tyr Gln Pro Tyr Leu Val Lys		
	1075	1080
		1085
Asp Ser Ile Arg Met Gln Trp His Arg Ser Gly Leu Ile Ala Thr Trp		
	1090	1095
		1100
Glu Phe Leu Glu Glu Tyr Val Glu Arg Lys Asn Gly Val Glu Asp Lys		
1105	1110	1115
		1120
Thr Leu Val Glu Lys His Ser Glu Lys Lys Trp Gly Val Met Val Val		
	1125	1130
		1135
Ile Lys Ser Leu Gln Phe Leu Pro Ala Ile Ile Ser Ala Ala Leu Arg		
	1140	1145
		1150
Glu Ala Thr Asn Asn Phe His Asp Pro Leu Lys Ser Gly Ser Gly Asp		
	1155	1160
		1165
Ser Ser Asn His Gly Asn Met Met His Ile Gly Leu Val Gly Ile Asn		
	1170	1175
		1180
Asn Gln Met Ser Leu Leu Gln Asp Ser Gly Asp Glu Asp Gln Ala Gln		
1185	1190	1195
		1200
Glu Arg Ile Asp Lys Leu Ala Lys Ile Leu Arg Glu Gln Glu Ile Gly		
	1205	1210
		1215

Ser Ile Ile His Ala Ala Gly Val Gly Asp Ile Ser Cys Ile Ile Gln
 1220 1225 1230
 Arg Asp Glu Gly Arg Ala Pro Met Arg His Ser Phe His Trp Ser Ser
 1235 1240 1245
 Glu Lys Leu Tyr Tyr Val Glu Glu Pro Leu Leu Leu His Leu Glu Pro
 1250 1255 1260
 Pro Leu Ser Ile Tyr Leu Glu Leu Asp Lys Leu Lys Cys Tyr Glu Asn
 1265 1270 1275 1280
 Ile Arg Tyr Thr Pro Ser Arg Asp Arg Gln Trp His Leu Tyr Thr Val
 1285 1290 1295
 Val Asp Thr Lys Pro Gln Pro Ile Gln Arg Met Phe Leu Arg Thr Leu
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 Ile Arg Gln Pro Thr Thr Asn Glu Gly Tyr Ser Ser Tyr Gln Arg Leu
 1315 1320 1325
 Asp Ala Glu Thr Ser Arg Thr Gln Leu Ala Met Ser Tyr Thr Ser Arg
 1330 1335 1340
 Ser Ile Phe Arg Ser Leu Met Gly Ala Met Glu Glu Leu Glu Leu Asn
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 Ser His Asn Thr Thr Ile Lys Ser Glu His Ala His Met Tyr Leu Tyr
 1365 1370 1375
 Ile Ile Arg Glu Gln Gln Ile Asp Asp Leu Val Pro Tyr Ser Lys Lys
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 Ile Asn Ile Glu Ala Gly Gln Glu Glu Thr Thr Val Glu Ala Ile Leu
 1395 1400 1405
 Glu Glu Leu Ala Gln Glu Ile His Ser Ser Val Gly Val Arg Met His
 1410 1415 1420
 Arg Leu Gly Val Phe Val Trp Glu Ile Lys Leu Trp Ile Thr Ala Cys
 1425 1430 1435 1440
 Gly Gln Ala Asn Gly Ala Trp Arg Val Ile Val Asn Asn Val Thr Gly
 1445 1450 1455
 His Thr Cys Thr Val His Ile Tyr Arg Glu Met Glu Asp Ala Thr Thr
 1460 1465 1470
 His Lys Val Val Tyr Ser Ser Val Thr Val Lys Gly Pro Leu His Gly
 1475 1480 1485
 Val Pro Val Asn Glu Asn Tyr Gln Pro Leu Gly Gly Ile Asp Arg Lys
 1490 1495 1500
 Arg Leu Ala Ala Arg Lys Asn Ser Thr Thr Tyr Cys Tyr Asp Phe Pro
 1505 1510 1515 1520
 Leu Ala Phe Gln Thr Ser Leu Glu Gln Ser Trp Ser Ile Gln Gln Thr
 1525 1530 1535
 Gly Ile Gln Arg Ala Asn Asp Lys Asp Leu Leu Lys Val Thr Glu Leu
 1540 1545 1550
 Lys Phe Ser Glu Lys Ala Gly Ser Trp Gly Thr Ser Leu Val Pro Ala
 1555 1560 1565
 Glu Arg Leu Pro Gly Leu Asn Asp Val Gly Met Val Ala Trp Leu Met
 1570 1575 1580
 Glu Met Cys Thr Pro Lys Phe Pro Ser Gly Arg Thr Ile Leu Val Val
 1585 1590 1595 1600
 Ser Asn Asp Val Thr Phe Lys Ala Gly Ser Phe Gly Pro Arg Glu Asp
 1605 1610 1615
 Ala Phe Phe Arg Ala Val Thr Asp Leu Ala Cys Ala Lys Lys Ile Pro
 1620 1625 1630
 Leu Ile Tyr Leu Ala Ala Asn Ser Gly Ala Arg Leu Gly Val Ala Glu
 1635 1640 1645
 Glu Val Lys Ala Cys Phe Lys Val Gly Trp Ser Glu Glu Ser Lys Pro
 1650 1655 1660
 Glu His Gly Phe Gln Tyr Val Tyr Leu Thr Pro Glu Asp Tyr Ala Arg

1665	1670	1675	1680
Ile Gly Ser Ser Val Met Ala His Glu Leu Lys Leu Glu Ser Gly Glu			
	1685	1690	1695
Thr Arg Trp Val Ile Asp Thr Ile Val Gly Lys Glu Asp Gly Leu Gly			
	1700	1705	1710
Val Glu Asn Leu Ser Gly Ser Gly Ala Ile Ala Gly Ala Tyr Ser Arg			
	1715	1720	1725
Ala Tyr Lys Glu Thr Phe Thr Leu Thr Tyr Val Thr Gly Arg Thr Val			
	1730	1735	1740
Gly Ile Gly Ala Tyr Leu Ala Arg Leu Gly Met Arg Cys Ile Gln Arg			
1745	1750	1755	1760
Leu Asp Gln Pro Ile Ile Leu Thr Gly Phe Ser Ala Leu Asn Lys Leu			
	1765	1770	1775
Leu Gly Arg Glu Val Tyr Ser Ser His Met Gln Leu Gly Gly Pro Lys			
	1780	1785	1790
Ile Met Ala Thr Asn Gly Val Val His Leu Thr Val Ser Asp Asp Leu			
	1795	1800	1805
Glu Gly Val Ser Ser Ile Leu Lys Trp Leu Ser Tyr Val Pro Ser His			
	1810	1815	1820
Val Gly Gly Ala Leu Pro Ile Val Lys Pro Leu Asp Pro Pro Glu Arg			
1825	1830	1835	1840
Glu Val Glu Tyr Leu Pro Glu Asn Ser Cys Asp Pro Arg Ala Ala Ile			
	1845	1850	1855
Ser Gly Thr Leu Asp Val Asn Gly Lys Trp Leu Gly Gly Ile Phe Asp			
	1860	1865	1870
Lys Asp Ser Phe Val Glu Thr Leu Glu Gly Trp Ala Arg Thr Val Val			
	1875	1880	1885
Thr Gly Arg Ala Lys Leu Gly Gly Ile Pro Val Gly Ile Val Ala Val			
	1890	1895	1900
Glu Thr Gln Thr Val Met Gln Ile Ile Pro Ala Asp Pro Gly Gln Leu			
1905	1910	1915	1920
Asp Ser His Glu Arg Val Val Pro Gln Ala Gly Gln Val Trp Phe Pro			
	1925	1930	1935
Asp Ser Ala Thr Lys Thr Ala Gln Ala Ile Leu Asp Phe Asn Arg Glu			
	1940	1945	1950
Glu Leu Pro Leu Phe Ile Ile Ala Asn Trp Arg Gly Phe Ser Gly Gly			
	1955	1960	1965
Gln Arg Asp Leu Phe Glu Gly Ile Leu Gln Ala Gly Ser Thr Ile Val			
	1970	1975	1980
Glu Asn Leu Arg Thr Tyr Lys Gln Pro Ile Phe Val Tyr Ile Pro Met			
1985	1990	1995	2000
Met Gly Glu Leu Arg Gly Gly Ala Trp Val Val Val Asp Ser Arg Ile			
	2005	2010	2015
Asn Ser Asp His Ile Glu Met Tyr Ala Glu Arg Thr Ala Lys Gly Asn			
	2020	2025	2030
Val Leu Glu Pro Glu Gly Met Ile Glu Ile Lys Phe Arg Thr Arg Glu			
	2035	2040	2045
Leu Leu Glu Cys Met Arg Arg Leu Asp Gln Gln Leu Ile Asn Leu Lys			
	2050	2055	2060
Glu Lys Leu Ser Glu Ala Lys Ser Asn Lys Asp Tyr Gly Ala Tyr Asp			
2065	2070	2075	2080
Ser Leu Gln Gln Gln Ile Arg Phe Arg Glu Lys Gln Leu Leu Pro Leu			
	2085	2090	2095
Tyr Thr Gln Ile Ala Thr Lys Phe Ala Glu Leu His Asp Thr Ser Leu			
	2100	2105	2110
Arg Met Lys Ala Lys Gly Val Ile Arg Glu Val Leu Asp Trp Arg Lys			
	2115	2120	2125

Ser Arg Ser Val Phe Tyr Gln Arg Leu His Arg Arg Ile Gly Glu His
 2130 2135 2140
 Ser Leu Ile Asn Ile Val Arg Asp Ala Ala Gly Asp Gln Leu Ser Tyr
 2145 2150 2155 2160
 Val Ser Ala Met Asn Leu Leu Lys Glu Trp Tyr Leu Asn Ser Asp Ile
 2165 2170 2175
 Ala Lys Gly Arg Glu Asp Ala Trp Leu Asp Asp Glu Ala Phe Phe Arg
 2180 2185 2190
 Trp Arg Asp Asp Pro Ala Asn Tyr Glu Asp Lys Leu Lys Glu Leu Arg
 2195 2200 2205
 Val Gln Arg Leu Leu Leu Gln Leu Thr Asn Ile Gly Asp Ser Ala Leu
 2210 2215 2220
 Asp Leu Gln Ala Leu Pro Gln Gly Leu Ala Ala Leu Leu Ser Lys Leu
 2225 2230 2235 2240
 Glu Ala Ser Ser Arg Asp Lys Leu Ile Ser Glu Leu Arg Lys Val Leu
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 Gly

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<220>
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<400> 9
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20

<210> 10
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<400> 10
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23

<210> 11
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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> representative construct (3' end)

<400> 11
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46

<210> 12
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 <212> DNA
 <213> Artificial Sequence

<220>

<223> representative construct (3' end)

<400> 12

ccttttataa aaaaaaaaaa aagaattcct gcagcccgga ggatcc

46